Volume 23, Issue 3

TRIBUTARY TRIBUNE

Stories and Art by Members of the Watershed Stewards Program

Year 23, District A

Nicole holding a Salamander. Photo credit: Stephanie Barron

Students measuring an Ensatina (sp. **Eschscholtzii**) salamander. Photo credit: David LaFever

Slender Salamander (Batrachoseps attenuates.) Photo credit: Stephanie Barron

Salamanders as Bioindicators of Watershed Health

Nicole Bejar- Bureau of Land Management Arcata

One of my primary responsibilities as a Member at the Bureau of Land Management (BLM) Arcata Field Office is conducting salamander surveys at Headwaters Forest Reserve (Headwaters). These surveys are not meant to study the salamanders per se, but more so to study whether BLM management actions are improving watershed health following an era of industrial logging and road building. Within the broader management goals for conserving Headwaters falls restoration of aquatic ecosystems and old-growth forests. ecosystem.

The two main management actions the BLM takes to address these components are road decommissioning, and forest thinning. The BLM has implemented many of these projects; however, they needed a way to quantify whether these actions are actually improving watershed health. This is where the salamanders come in: as bioindicators. A bioindicator is an organism whose status gives scientists an idea about the health of the ecosystem. ***Article continued on page 2>>>***

In this Issue:

A program of the California Conservation Corps, WSP is one of the most productive programs for future employment in natural resources. WSP is administered by California Volunteers and sponsored by the Corporation for National and Community Service.

Salamanders as Bioindicators of Watershed Health, continued from Page 1…

Salamanders are ideal bioindicators because they are abundant, interconnected with numerous species in the redwood forest food web, and highly sensitive to environmental stressors. Lungless salamanders of the family *Plethodontidae* are one of the most abundant small vertebrate faunas in temperate rainforests making them easy to sample. Ensatina and California Slender Salamanders are the two main species we are looking for in Headwaters. They serve their role in the primary part of the food web by consuming small invertebrates, and a diverse array of predators prey on salamanders including snakes, small mammals, and birds. Their interconnectedness with other species means a decline in the salamander populations would set off a cascade-effect across the food web, potentially leading to the decline of other species. Plethodontids, as amphibians, are sensitive creatures and dependent on the moist conditions provided by mature forests. Leaf litter and the upper soil layer provide a damp environment for salamanders, which require contact with moisture for respiration. Activities that open the canopy, such as logging and road construction, increase moisture loss through evapotranspiration and promote dry litter layers, which are inhospitable to salamanders and other hydrophilic fauna. Because of this we anticipate that salamanders will be less common in logged forests, but will increase overtime as the forest recovers. Although not enough data has been collected to draw conclusions from the survey yet, continued monitoring will illustrate watershed recovery in Headwaters Forest Reserve.

Year 23 Region I District A Members. Photo credit: Jennifer Catsos

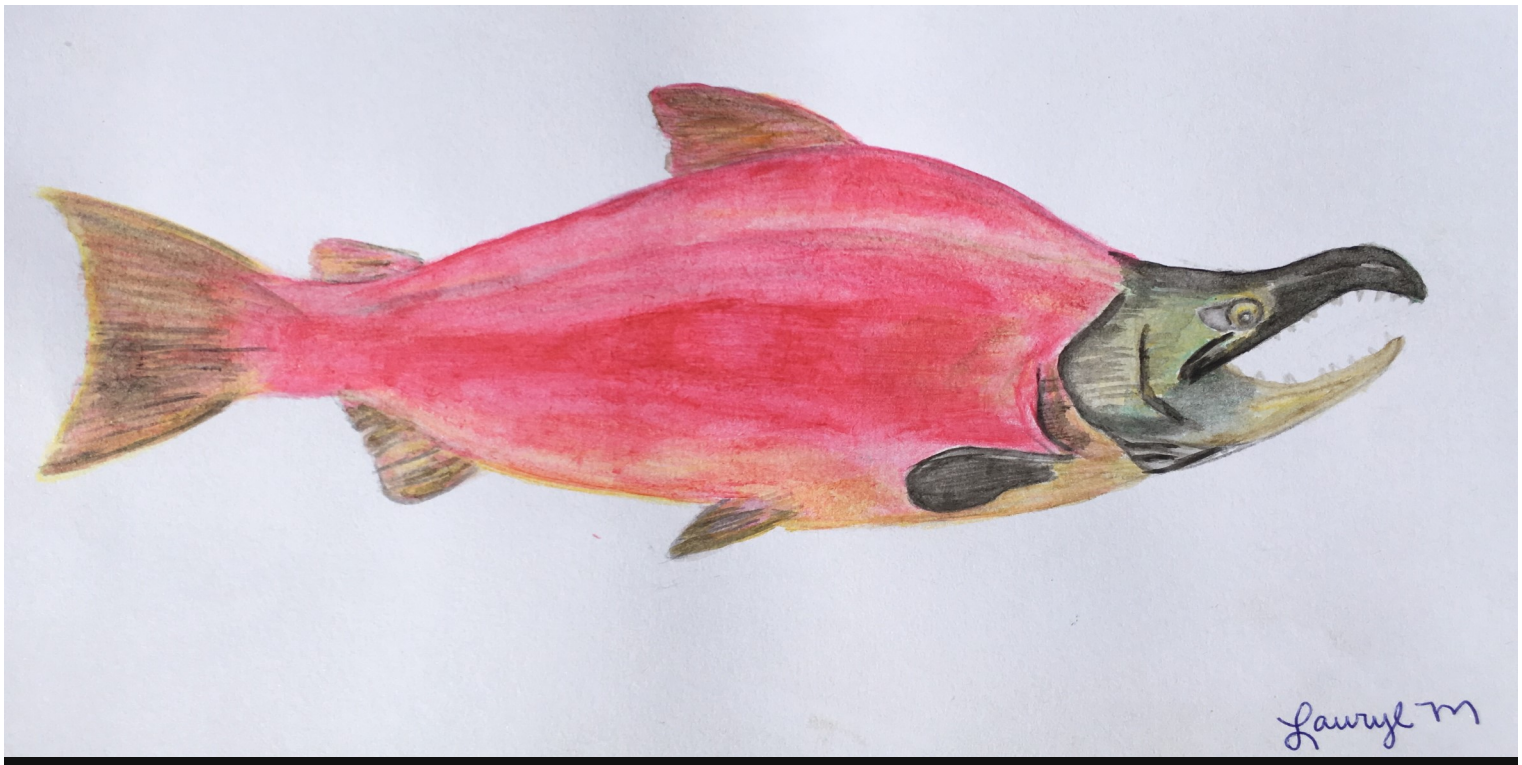
CDFW Yreka Members Leanne Cohn and Martin Anderson teach about macroinvertebrates at Fish Fair. Photo credit: Stephanie Barron

About the Watershed Stewards Program

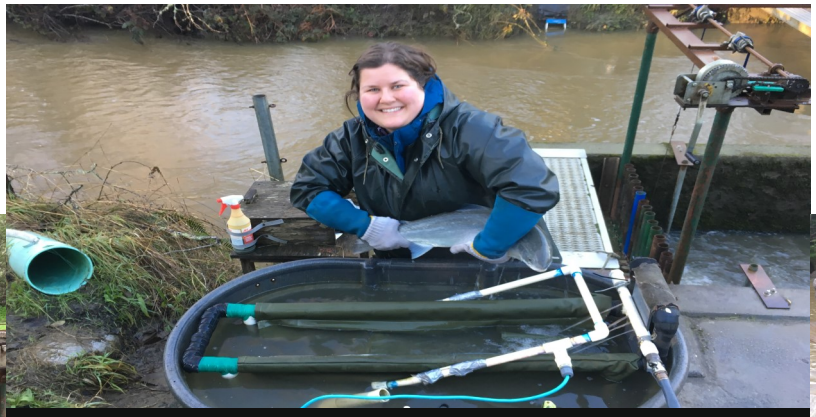
Since 1994, the Watershed Stewards Program (WSP) has been engaged in comprehensive, community-based, watershed restoration and education throughout coastal California. WSP was created in 1994 by California Department of Fish and Wildlife (CDFW) biologists, educators, and the California Conservation Corps to fill critical gaps in scientific data collection, in-stream restoration, and watershed education. In collaboration with landowners, tribal communities, teachers, community members, nonprofit organizations, and government agencies, WSP works to revitalize watersheds that contain endangered and threatened salmonid species (Chinook salmon, Coho salmon, and steelhead trout) by using state-of-the-art data collection and watershed restoration techniques. WSP also engages members in education, ou reach, and volunteer recruitment efforts to increase the capacity of partner organizations. WSP currently has Members working from the Oregon border to the Santa Monica

Fish Everywhere!

Lauryl McFarland– California Fish and Wildlife Arcata



"Tribute to Sockeye Salmon (Oncorhynchus nerka)" By Lauryl McFarland



Tagging the first adult Steelhead trout (Oncorhynchus mykiss) of the season! Photo credit: Amanda Lee

PIT-tagging a Coastal Cutthroat trout (Oncorhynchus clarkii clarki.) Photo credit: Maia Claman

Spawing Steelhead trout (Oncorhynchus mykiss) at the down-stream migrant trap. Photo credit: Maia Claman

Chum salmon (Oncorhynchus keta)Their distinct,zebra-like markings make them easy to identify. Photo credit: Lauryl McFarland

Snow Salmon Photo Credit: Martin Anderson

Eroding what was once Fixed

Dejaleah Malone-Persha– U.S Forest Service Orleans

slivers of light
spring forth

sweet water

whose dendritic tendrils
impress upon the mutable

transport
sloughed sediment
fragments laying adjacent

sweep debris
as the ribbons trace
rinsed ravines

sweet water

whose transparent sheets
invoke a crumbling

stone succumbing
beneath

collapse
vertical

Calves
relief

upheaval

birthed
from mere rivulets

sweet water

whose memory engraves
with calligraphy

a story

of presence

in the wake of absence

Winter Wonderland

Martin Anderson– California Department of Fish and Wildlife, Yreka

"It only snowed a couple inches here last year". These words spoken by the property manager echoed in my mind as I stood on the back porch of my apartment on the morning of January 4th, 2017, surveying the fifteen inches that had accumulated in the last 24 hours. The previous evening, I had enjoyed building a snow fort around the tree in my front yard just for the sake of building a snow fort. A two foot deep berm from the plow was piled up alongside my car. Fortunately my folks lent me their Subaru for the winter so I punched through the fluffy powder and onto the icy road. Unfortunately I couldn't go through the powder filling the CDFW parking lot until an employee with a bobcat tractor cleared the path. When I got in I was the only person from our office building there so I occupied myself by shoveling the entry walkways. It was definitely a snow day!

Two other Klamath River Project employees eventually made it in. My Mentors live out of town so they were all snowed in, as were most of the others. Interstate 5 was closed most of the day. The three of us went out to Bogus Creek to change the drive on the video monitoring station. It was a beautiful bluebird day with the entire valley covered in a brilliant blanket of shimmering snow. We simply had to pause to take pictures of the Shasta and Klamath Rivers and Mount Shasta. We passed through the Iron Gate Fish Hatchery where employees were plowing and shoveling snow.

They used brooms to knock snow from the broken mesh awnings over one of the raceways to prevent them from collapsing completely on top of the yearling Coho salmon.

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"Forks of the Smith" By Amanda Lee
California Department of Fish and Wildlife Arcata

A Climate of Change for Salmonids

Blake Batten– Yurok Tribe Environmental Program

Since time immemorial, salmonids and other anadromous fish have transported vital marine-derived nutrients to California watersheds. While ecologically problematic, the decline of salmon is also detrimental to the cultural and economic life of tribal members and communities that depend upon these fish for subsistence. Along with habitat degradation, pollution, and artificial propagation, global climate change threatens salmonids and the integrity of associated ecosystems. The International Union for Conservation of Nature (2009) asserts that climate change may exacerbate existing anthropogenic stressors, particularly in the southern portion of historical salmonid ranges. Projected impacts include: increased water temperatures, decreased dissolved oxygen levels, increased toxicity of pollutants (Ficke et al. 2007), decreased growth rates and impaired smoltification (Beamish et al. 2010) as well as reduced avoidance behavior at higher CO_2 levels (Munday 2015).

Comprising a complex socio-ecological system of diverse stakeholders, the Klamath River Basin has historically been the most important river system for anadromous fish on the North Coast. Already on the ecological edge of supporting coldwater fish, Barthalow (2005) found that it is highly likely the lower mainstem Klamath has been warming by approximately 0.5°C per decade since the early 1960's. Bisson (2008) notes, "policies that explicitly maintain instream flows by limiting water withdrawals, enhancing flood-plain connectivity by opening historically flooded areas where possible, removing anthropogenic barriers to fish movement, and protecting riparian forests will be needed to conserve habitat resilience in the face of climate change." In addition to restoration and education, mitigating greenhouse gas emissions to protect the global climate will be essential to conserving anadromous watersheds for future generations.

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By the End of this Century

Josh Fishbein– U.S Forest Service Orleans

Rain. California's rain, specifically, floats over the pacific in a moisture plume called the *pineapple express*- – because it starts near Hawai'ian waters and brings us plenty of water fast. In fact, as of this writing, California is waterlogged. SoCal superblooms carpet deserts; in the central valley, farmers are ready for a good almond harvest; and we can water our brown lawns green again.

But when the pineapple express hits us twenty or thirty times during an unusually warm 21st century, water doesn't stick around in mountain snowpack, groundwater, or aquifers. This year's rain is an illusion, because it doesn't mean the long hot drought is over. And what we once thought of as a pineapple express is taking on darker shades as it floods homes, makes mudslides of mountains, and fills our reservoirs and dammed rivers to the brim.

Despite our palms, eucalyptuses, and sunny beaches, 2017's rain is less a reminder of California's tropical aspirations, and more of its bipolar unpredictability between the forested north and desert south. So maybe you've noticed that we've renamed the pineapple express. So instead, we've taken to calling all that water by a synonymous but more ominous name : the *atmospheric river*. They mean the same thing, but the pineapple express is specific to our region, and is not a technical term. The atmospheric river is cold, abstract, and surreal.

A river in the sky.

The words hang overhead in cumulonimbus grey. We ought to ask why this meteorological term bleeds into the vernacular. But the answer is obvious: the nature of nature is changing. The blithe and misguided celebration of the drought's false ending must be checked by that pregnant phrase, *atmospheric river*. When the hot sky lifts water by the lake-full from the pacific, desperately tries to cool itself: a narrow plume carrying as much water as the Mississippi, and aims it at the north coast.

A raging Klamath River after heavy rains flowing at 130,000 CFS—its peak flow for 2017. Orleans, CA. Photo Credit: Deja Malone-Persha

It's like the sword of Damocles, or better yet, like the missile's pointed tip in *Gravity's Rainbow* that Pirate Prentice imagines, just before it makes impact. But we don't have a sword or a missile aimed at us. Instead, it's a whole atmosphere of water, hail, and snow, heaving itself landward as the oceans fill to bursting, deadweight and ready to drown the whole state.

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"Swirling Salmonids" By Leanne Cohn
California Department of Fish and Wildlife Yreka

District A Members at the end of Fish Fair the Required Outreach Event for the Northernmost region. Photo credit :John Herrara

>>> A Climate of Change for Salmonids, continued from page 5

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Mapping the Mattole River Estuary

Emily Moloney- Bureau of Land Management Arcata

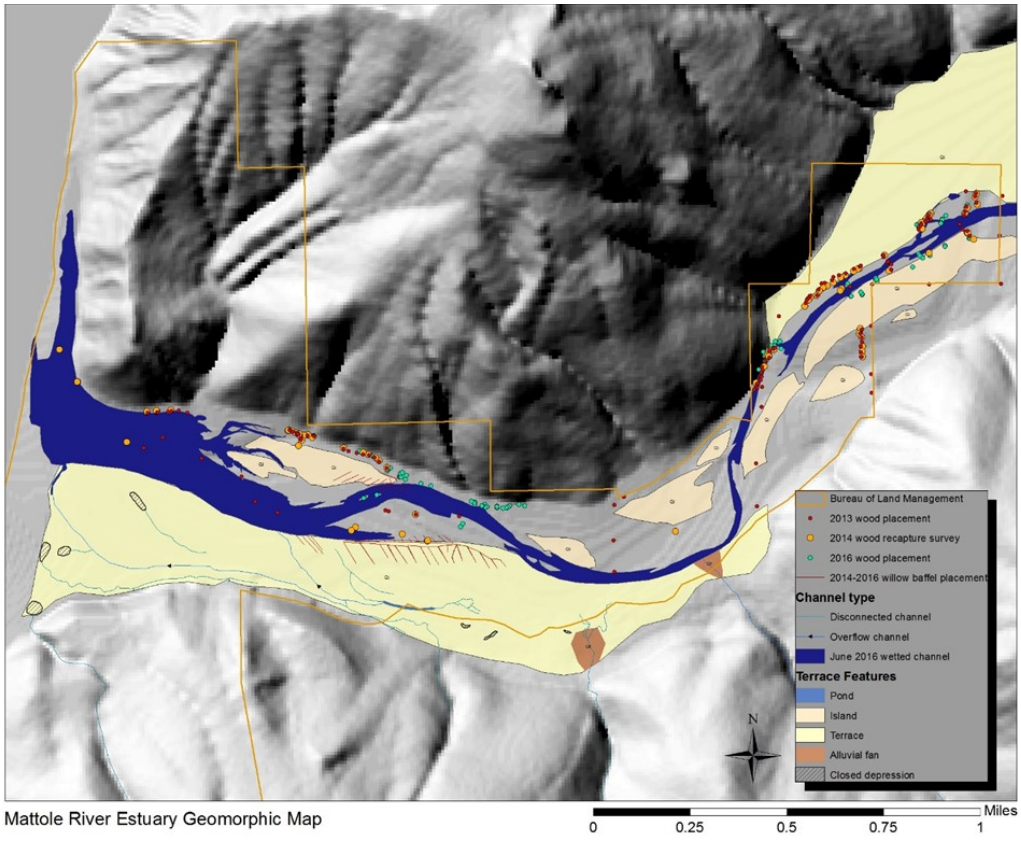

Figure 1. Features mapped are used to inform restoration planning.

Draining into the Pacific Ocean near the community of Petrolia in northern California is the Mattole River estuary - a dynamic place where the river meets the sea. The Mattole Salmon Group, Mattole Restoration Council and Bureau of Land Management (BLM) share a long history in the estuary working to restore its physical diversity and biological richness. These groups are currently planning the next five years of estuary restoration. With successful projects already implemented, the 2018 - 2022 plan seeks to improve estuary complexity and off-channel habitat for Chinook, coho and steelhead.

The Mattole River estuary is a complex and dynamic system affected by many factors including, unstable geologic conditions, and prior land uses, including, timber harvest, road building, homesteading, grazing and agriculture. Increased sediment from an impacted watershed has filled in the once deep and topographically complex estuary (BLM, 2016). Because of simplification and shallowing in the estuary, conditions become lethal to fish mid-summer when the river disconnects from the ocean and forms a lagoon. The summer lagoon is food starved, hot, and lacks cold-water refugia, causing a decline in summer-rearing juvenile salmonid populations over the last four decades (Berg and Halligan, 2011). To keep fish alive, the estuary needs topographic complexity including, deep pools, large woody debris, off-channel wetland and floodplain habitat, and robust riparian forest.

To inform restoration plans and decisions, Watershed Steward Program members at the BLM surveyed the Mattole estuary and created a geomorphic map to illustrate the topographic characteristics of the estuary (figure 1). Understanding the geomorphic setting of the estuary is critical to understanding where and how to prescribe restoration. The map includes features such as islands, terraces, alluvial fans, connected and disconnected channels, closed depressions, and ponds. Of particular interest are the locations of terrace channels, which represent prior main channel locations. These channels are restoration candidates for off-channel cold-water habitat for summer-rearing salmonids. When main channel water temperatures get too high, fish can flee to cooler food-rich off-channel habitats and increase their chances of survival. Restoration planners will use this map to make decisions on how to reconnect terrace channels with the river to provide necessary refugia for salmonids.

Emily Moloney working in the Mattole River Valley. Photo credit: Nicole Bejar

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Alum Spotlight: Brianna Walsh

Stephanie Barron- Watershed Stewards Program Fortuna

Q: *Where and what years did you serve with WSP*

A: I served with WSP in year 21 and year 22 at USFS Orleans and Point Reyes National Seashore respectively.

Q: *Where do you currently work and how did WSP prepare you for the job you have today?*

A: I currently work for U.S Fish and Wildlife Service as a Biological Science technician doing red and carcass surveys in the fall, trapping in the spring, and habitat surveys in the summer. I am based out of Arcata but do work on the lower Klamath up to Iron Gate Dam and I also work on the Trinity River up to Weaverville. Without WSP, I wouldn't be where I am today. WSP taught me the skills necessary to do almost every aspect of my job.

Q: *What was your most memorable experience at your Placement Site(s)*

A: It's hard to pick just one memorable experience from the wealth of choices after two years, but here goes! For Orleans, I'd have to say the Wooley Creek trip stand out the most. For these surveys, you backpack 10 miles on a very rough trail and spend two nights at a historic wood cabin so you can conduct snorkel surveys. The hike is tough, but I got to enjoy a beautiful, pristine creek and really bond with everyone out there with me. As for Point Reyes, living out next to the lighthouse led to some wacky adventures, since I was either completely alone or totally mobbed by tourists.

Brianna Walsh in her natural habitat along the Salmon River. Photo Credit Christine Cosby

Q: *What was the most challenging moment at your Placement Site(s)*

A: I would say my most challenging experience in Orleans was probably helping to organize the Klamath Trinity Fish Fair. Recruiting presenters and making sure that everything was planned out smoothly was a huge challenge and led to some late nights. But it was worth it to see the event succeed. For Point Reyes, I would say the toughest times were when I was stuck doing data entry when it was a beautiful day outside.

Q: *What tips would you give to current Members?*

A: My advice for current members is advocate for yourself. If there's something that your office is involved with that you're interested in, talk to your Mentors and see if you can get involved too. WSP is a great way to get experience doing a lot of things, so take advantage if you can and try new things!

Cameron Hayvaert checking bouyes on the Klamath River. Photo credit: Blake Batten

View of the Klamath Basin. Photo credit: Blake Batten

YTEP Members Blake Batten and Cameron Hayvaert measuring flow in Blue Creek. Photo Credit: Stephanie Barron

Without the Mountain

Cameron Hayvaert– Yurok Tribe Environmental Program

"Only the mountain has lived long enough to listen objectively to the howl of a wolf." (Aldo Leopold) But what happens when that wolf is removed from the mountain?

During Region I training, we took a trip to the Scotia Fisheries Exhibit. The exhibit design was well crafted and borrowed the local forest's ambiance. An arched lattice of wooden panels shaded the cool tanks below while grasses, ferns, and dogwoods adorned exhibit walls. The fish were numerous and boasted each stage of the anadromous life cycle, offering a rich educational experience to the general passerby. Yet, a prolonged viewing disclosed the true health of the salmonids, even to the most uninformed visitor. Opaque eyes, atrophied muscles, and bloated bellies marked all but several of the fish. An outstretched arm evoked an anticipation to hastily devour food, a peculiarity for what would otherwise trigger a skittish instinct that thousands of years had refined. The fish were numb to a severe struggle for life and therefore had been swimming in circles without the necessity to sniff for natal streams or wrestle currents that are capable of discharging more water per second than I will drink in a lifetime.

As I monitor these currents, I only need to gaze toward the canopy above me for a reframed view of this imposed judgment. The coastal redwoods that span these rivers hold a substantial vantage point above my six-foot frame, and store several hundred years of observations to forge a more equitable judgment. From the elevated perspective of these versed historians, how am I viewed; as a member of a human society that is disconnected from nature's severe struggles? Am I swimming in circles in a similar manner to those encaged salmonids? Am I physically and mentally atrophied by a surfeit of resources provided by our society? What does my aquarium look like? If those struggles allow organisms to prosperously live on all corners of the planet for three and a half billion years, then from the viewpoint of the redwoods, don't I look the same as those encaged salmon.

In a watershed deprived of salmon and stripped of redwoods, my perspective of the natural world loses sincerity and my consciousness loses accountability - perhaps like a wolf removed from the mountain.

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This is why I serve

Stephanie Barron, Watershed Stewards Program Team Leader District A

Everyday reading emails,

Answering questions

Making meetings

Organizing, planning,

WAPs[1], WOW![2]

Nor to SoCal

Each day scheduled

Indoors, Outdoors,

The motto "Get stuff done" fulfilled

Plans into successful events,

Minds into stewards of the future

Development with every effort

Every opportunity

that much closer to

happy responsibility

Hope of freedom

Debts forgiven

Ten years- public service at a minimum

Through service there is peace

Humility that working harder for less brings

Teaching, learning, and growing

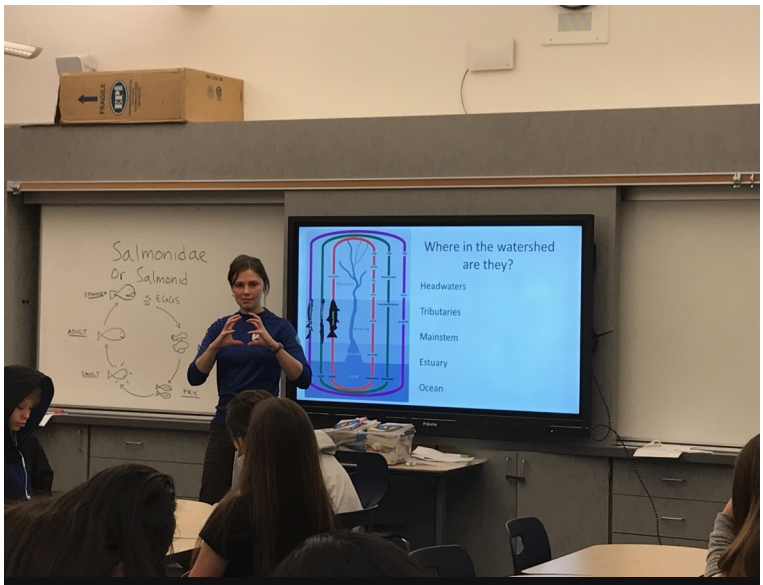
Never stop moving!

This is why I serve...

Definitions:

WOW![1]: Wonders of Watersheds , the curriculum each Member utilizes when teaching students .

WAP[2]: Watershed Awareness Project. A volunteer event each Member organizes that directly benefits a historically salmon bearing stream.



Orleans Forest Service Member Deja Malone– Persha teaching at Hoopa Elementary. Photo credit: Stephanie Barron

Orleans Forest Service Member Josh Fishbein on the Wooly Creek Trail hiking out for spawner surveys. Photo credit: Deja Malone-Persha

District A Team Leader Stephanie Barron teaching Salmon Anatomy a Crystal Valley's Fish Festival. Photo credit: Karlee Jewell

>>>Winter Wonderland, continued from page 4

It was downright gorgeous at Bogus. The creek was clear and gurgling, and soft white snow covered the banks and overhanging riparian branches. I shoveled the work area while my co-workers changed the drive and adjusted the sensitivity of the motion sensor. Many pictures were taken. We made it back safely after which my coworkers took off and I had the office all to myself to watch video and record Coho and Steelhead passage through the video box from previous days. I finished my work day off by building a snow salmon.

CDFW Arcata Member Amanda Lee volunteering for National Service Day III with Eureka Civic Spark. Photo credit: Stephanie Barron

CDFW Yreka Members Martin Anderson and Leanne Cohn enjoying a snow day. Photo Credit: Jason Carnahan

>>>By the End of the Century, continued from Page 6

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Find out more about the program on our website:
www.ccc.ca.gov/go/wsp

Our Mission

The Watershed Stewards Program's (WSP) mission is to conserve, restore, and enhance anadromous watersheds for future generations by linking education with high quality scientific practices.

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Become a WSP Member! Learn more about the program and find our application at:
www.ccc.ca.gov/go/wsp